

CLAIMS

1. A generator-motor comprising:

a motor including a rotor (55) and a stator (56, 57) and attaining a function as a
5 motor-generator; and

a control device (20, 81, 82A to 82C, 83, 84) arranged on an end surface of said motor (50) so as to surround a rotation shaft (50A) of said motor (50) and controlling drive of said motor (50).

2. The generator-motor according to claim 1, wherein

said control device (20, 81, 82A to 82C, 83, 84, 86A to 86F) includes

first, second and third electrode plates (81, 82A to 82C, 83) arranged so as to substantially form a U-shape to surround the rotation shaft (50A) of said motor (50),
and

a polyphase switching element group (23 to 25) controlling a current supplied to said stator (56, 57),

said polyphase switching element group (Tr1 to Tr6) is constituted of a plurality of arms (23 to 25), a number of the arms corresponding to a number of phases of said motor (50), and each arm constituted of first and second switching elements (Tr1, Tr2; Tr3, Tr4; Tr5, Tr6),

said first electrode plate (81) is arranged in a position apart from said rotation shaft (50A) by a prescribed distance in a direction perpendicular to said rotation shaft (50A),

said second and third electrode plates (82A to 82C, 83) are arranged outside said
first electrode plate (81),

said first and second switching elements (Tr1, Tr2; Tr3, Tr4; Tr5, Tr6) are connected electrically in series between said first electrode plate (81) and said third electrode plate (83),

said plurality of first switching elements (Tr1, Tr3, Tr5) are arranged on said first electrode plate (81), and

said plurality of second switching elements (Tr2, Tr4, Tr6) are arranged on said second electrode plate (82A to 82C).

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3. The generator-motor according to claim 2, wherein

said control device (20, 81, 82A to 82C, 83, 84, 86A to 86F) further includes a control circuit (70) controlling said plurality of first and second switching elements (Tr1, Tr2, Tr3, Tr4, Tr5, Tr6), and

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said control circuit (70) is provided on a ceramic substrate (84) arranged in a direction similar to an inplane direction of said first, second and third electrode plates (81, 82A to 82C, 83) in a substantially U-shaped notch.

4. The generator-motor according to claim 3, wherein

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said control device (20, 81, 82A to 82C, 83, 84, 86A to 86F) further includes a plurality of first wires (86A, 86C, 86E) connecting said control circuit (70) to said plurality of first switching elements (Tr1, Tr3, Tr5), and

a plurality of second wires (86B, 86D, 86F) connecting said control circuit (70) to said plurality of second switching elements (Tr2, Tr4, Tr6),

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said plurality of first wires (86A, 86C, 86E) are arranged between said rotation shaft (50A) and said first electrode plate (81) so as to surround said rotation shaft (50A), and

said plurality of second wires (86B, 86D, 86F) are arranged between said rotation shaft (50A) and said first electrode plate (81) and between said first electrode plate (81) and said motor (50).

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5. The generator-motor according to claim 4, wherein

each of said plurality of first and second switching elements (Tr1 to Tr6)

includes

a control terminal (G) receiving a control signal from said plurality of first wires (86A, 86C, 86E) or said plurality of second wires (86B, 86D, 86F),

an input terminal (D) receiving a direct current, and

5 an output terminal (S) outputting a direct current in accordance with control contents by said control signal,

said input terminal (D) of said first switching element (Tr1, Tr3, Tr5) is in contact with said first electrode plate (81),

10 said control terminal (G) of said first switching element (Tr1, Tr3, Tr5) is arranged on a side of said rotation shaft (50A) and connected to said first wire (86A, 86C, 86E),

said output terminal (S) of said first switching element (Tr1, Tr3, Tr5) is arranged on a side of said second electrode plate (82A to 82C) and connected to said second electrode plate (82A to 82C),

15 said input terminal (D) of said second switching element (Tr2, Tr4, Tr6) is in contact with said second electrode plate (82A to 82C),

said control terminal (G) of said second switching element (Tr2, Tr4, Tr6) is arranged on a side of said rotation shaft (G) and connected to said second wire (86B, 86D, 86F), and

20 said output terminal (S) of said second switching element (Tr2, Tr4, Tr6) is arranged on a side of said third electrode plate (83) and connected to said third electrode plate (83).

6. The generator-motor according to claim 2, wherein

25 said first and second electrode plates (81, 82A to 82C) are arranged in a first plane, and

said third electrode plate (83) is arranged in a second plane different from said first plane.

7. The generator-motor according to claim 6, wherein
said second plane is located closer to said motor (50) than said first plane is.

5 8. The generator-motor according to claim 2, wherein
said plurality of arms (23 to 25) are radially arranged in the inplane direction of
said first, second and third electrode plates (81, 82A to 82C, 83).

9. The generator-motor according to claim 1, wherein
10 said control device (20, 81, 82A to 82C, 83, 84, 86A to 86F) includes
first and second electrode plates (81, 82A to 82C) arranged so as to substantially
form a U-shape to surround the rotation shaft (50A) of said motor (50),
a polyphase switching element group (Tr1 to Tr6) controlling a current supplied
to said stator (56, 57), and
15 a control circuit (70) controlling said polyphase switching element group (Tr1 to
Tr6), and

said control circuit (70) is provided on a ceramic substrate (84) arranged in a
direction similar to an inplane direction of said first and second electrode plates (81, 82A
to 82C) in a substantially U-shaped notch.

20 10. The generator-motor according to claim 9, wherein
said control circuit (70) is resin-molded.

11. The generator-motor according to claim 9, wherein
25 said control device (20, 81, 82A to 82C, 83, 84, 86A to 86F) further includes a
Zener diode (DT1 to DT3) protecting said polyphase switching element group (Tr1 to
Tr6) against surge, and
said Zener diode (DT1 to DT3) is arranged in said notch.

12. The generator-motor according to claim 9, wherein
said control device (20, 81, 82A to 82C, 83, 84, 86A to 86F) further includes a
capacitive element (22) smoothing a DC voltage from a DC power supply (10) and
5 supplying the smoothed DC voltage to said polyphase switching element group (Tr1 to
Tr6), and

said capacitive element (22) is arranged between said ceramic substrate (84) and
said second electrode plate (82A to 82C).

10 13. The generator-motor according to claim 9, wherein
said control device (20, 81, 82A to 82C, 83, 84, 86A to 86F) further includes a
field coil control unit (40) controlling current feed to a field coil (54) different from said
stator (56, 57), and

said field coil control unit (40) is arranged on said ceramic substrate (84).

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14. The generator-motor according to claim 9, wherein
a leadframe (86A to 86F) continuing to said first and second electrode plates (81,
82A to 82C) from said ceramic substrate (84) and said first and second electrode plates
(81, 82A to 82C) are arranged in an identical plane.

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